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JoAnn Villamizar
Ciba Corporation/Patent Department
540 White Plains Road
P.O. Box 2005
Tarrytown, NY 10591

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YOON, TAE H	

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andrea.dececchis@ciba.com
deborah.pinori@ciba.com
sonny.nkansa@basf.com

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Ex parte JAN MALIK, KLAUS STOLL and ANDREAS THUERMER

Appeal 2009-003753
Application 09/868,871
Technology Center 1700

Decided:[1] May 28, 2009

Before ERIC GRIMES, MELANIE L. MCCOLLUM, and STEPHEN WALSH, *Administrative Patent Judges*.

WALSH, *Administrative Patent Judge*.

DECISION ON APPEAL

This is an appeal under 35 U.S.C. § 134 involving claims to a thermoplastic polymer article, to a method for enhancing the processing stability of various polyethylenes, and to a masterbatch composition. The

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[1] The two-month time period for filing an appeal or commencing a civil action, as recited in 37 C.F.R. § 1.304, begins to run from the decided date shown on this page of the decision. The time period does not run from the Mail Date (paper delivery) or Notification Date (electronic delivery).

Patent Examiner rejected the claims as obvious. We have jurisdiction under 35 U.S.C. § 6(b). We affirm.

STATEMENT OF THE CASE

The Specification explains that high temperatures and pressures used for processing polymers have an adverse effect on the properties and appearance of the finished articles. (Spec. 1:6-8.) According to the Specification, stabilizer compositions can improve the processing stability and color of final products made from polyethylene-based thermoplastic polymers. (*Id.* at 2:1-3.) "It has surprisingly been found that relatively small additions of α-tocopherol to known additive systems for polyethylene-based polymers, composed of a phenolic antioxidant and a phosphorous based secondary antioxidant, results in an unexpected synergistic effect." (*Id.* at 2:5-8.)

Claims 1-7, 9, 12, 13, 15 and 17, which are all the pending claims, are on appeal. The Examiner relied on the following prior art:

Fukui et al.	5,100,930	Mar. 31, 1992
Laermer et al.	5,308,549	May 3, 1994
Keller et al.	5,574,082	Nov. 12, 1996
Tamura et al.	6,096,814	Aug. 1, 2000
Nakajima	JP 62-158737	Jul. 14, 1987
Kehrli et al.	DE 3903218	Aug. 24, 1989

The Examiner rejected the claims as follows:

• claims 1-7, 12 and 13 under 35 U.S.C. §103(a) as unpatentable over Kehrli, Keller, Nakajima, Fukui and Laermer; and

• claims 1-7, 9, 12, 13, 15, and 17 under 35 U.S.C. §103(a) as unpatentable over Kehrli, Keller, Nakajima, Fukui, Tamura, and Laermer.

The claims have not been argued separately and therefore stand or fall together.[2] 37 C.F.R. § 41.37(c)(1)(vii). Claims 1, 9, 15 and 17 are illustrative and read as follows:

1. A thermoplastic polymer article comprising:

high density polyethylene, low density polyethylene, linear low density polyethylene, ultra low density polyethylene or ultra high molecular weight polyethylene and incorporated therein

a) at least one sterically hindered phenol,
b) at least one phosphorus-containing secondary antioxidant, and
c) at least one tocopherol compound

wherein the weight ratio of component (a) to component (b) is from 2:1 to 1:4 and the weight ratio of component (a) to component (c) is from 2:l to 10:l.

9. A masterbatch composition comprising

90 to 20% by weight of high density polyethylene, low density polyethylene, linear low density polyethylene, ultra low density polyethylene or ultra high molecular weight polyethylene and 10 to 80% by weight, in total, of

a) at least one sterically hindered phenol,
b) at least one phosphorus-containing secondary antioxidant, and
c) at least one tocopherol compound

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[2] Appellants do state that "present claims 15 and 17 are aimed more specifically at the invention as supported by the Thürmer Declaration" (App. Br. 8). However, as we do not rely on the Examiner's commensurate in scope argument in affirming the rejection, we do not consider this a separate argument for patentability.

wherein the weight ratio of component (a) to component (b) is from 2:1 to 1:4 and the weight ratio of component (a) to component (c) is from 2:1 to 10:l.

15. A polymer article according to claim 1 wherein

component a) is tetrakis[methylene-3-(3',5')-di-tert-butyl-4'-hydroxyphenyl)propionate]methane,

component b) is a mixture of 50-80 parts by weight of tetrakis(2,4-di-tert-butylphenyl)-biphenylene-diphosphonite, 10-25 parts by weight of bis(2,4-di-tert-butylphenyl)biphenylene-monophosphonite and 10-25 parts by weight of tris-(2,4-di-tert-butylphenyl)phosphite and

component c) is α-tocopherol,

where the weight ratio of component (a) to component (b) is from 2:1 to 1:1 and the weight ratio of component (a) to component (c) is from 5:1 to 10:1.

17. A polymer article according to claim 15 where the weight ratio of component (a) to component (b) is 1:1 and the weight ratio of component (a) to component (c) is 10:1.

OBVIOUSNESS

The Issue

The Examiner's position is that components (a), (b), and (c) defined in Appellants' claims were known for stabilizing polyethylene. (Ans. 3.) The Examiner found that Kehrli taught polyethylene stabilizer compositions comprising a sterically hindered phenol (component (a)), a phosphorous containing antioxidant (component (b)), and α-tocopherol (component (c)), but in differing amounts than claimed. (*Id.*) However, the Examiner found that using the stabilizer kinds and amounts claimed were "well known

practice," as evidenced by Keller, Nakajima, Fukui, and Laermer. (*Id.* at 3-4.) The Examiner concluded it would have been obvious to modify the additives and the amounts in Kehrli's compositions because it was routine practice. (*Id.* at 4.) Relying on Tamura's disclosure of stabilizer with polyolefin in a masterbatch form, the Examiner similarly concluded that Appellants' claim 9 masterbatch would have been obvious over the combined teachings in the cited prior art. (*Id.* at 5.)

Appellants do not dispute that the Examiner's evidence of obviousness properly shifted the burden to them to provide objective evidence of nonobviousness. However, Appellants contend they rebutted obviousness with the second Thürmer Declaration, filed Sept. 25, 2006, which is said to show unexpectedly superior results. (App. Br. 7.)[3] According to Appellants, the Declaration evidences that "inventive samples 3 and 4 are clearly and unexpectedly superior to prior art samples 1 and 2," which are said to contain Kehrli's Examples 3 and 4. (*Id.*)

The Examiner considered the Thürmer Declaration but found it insufficient evidence of nonobviousness. (Ans. 6.)

The issues are:

Did Appellants establish unexpected results; and

do the evidence of obviousness and the objective evidence of nonobviousness taken together weigh in favor of patentability?

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[3] Citations are to the "Supplemental Appeal Brief," having a certificate of mailing dated July 9, 2008.

Findings of Fact

Kehrli

1. Kehrli taught that polymer organic compounds were effectively stabilized against yellowing and decomposition by mixing in stabilizers. (2.)[4]
2. Kehrli disclosed stabilizers consisting of 30-80 wt% of a sterically-hindered phenolic antioxidant, and 20-70 wt% of an organic phosphite compound. (2.)
3. Kehrli's sterically-hindered phenolic antioxidants and organic phosphite compounds included those listed in Appellants' claims. (3.)
4. Kehrli optionally included α-tocopherol. (4.)
5. Kehrli's stabilizers were mixed into the polymer before, during or after polymerization; and could be used in solid or molten form, or in solution, e.g. as a 10-90 wt% concentrate "master batch" with the plastic to be stabilized. (4.)
6. The stabilizers were suitable for all polyolefins including polyethylene and polypropylene. (4.)
7. Kehrli provided several example compositions. (5.)

Nakajima

8. Nakajima disclosed that polyolefins had a problem resisting thermal oxidation degradation in a melting and kneading process. (4, ¶2.)[5]

[4] The citations to Kehrli are to the translation of record.
[5] The citations to Nakajima are to the translation of record.

9. According to Nakajima, phenolic antioxidants had been widely used as a process stabilizer to prevent thermal oxidation degradation. (4, ¶2.)
10. According to Nakajima, tocopherols were also known as process stabilizers, but had to be used in large quantity for thermal process stability. (4, ¶3.)
11. Nakajima taught that when tocopherols were used in large quantity, there was a considerable coloration problem. (4, ¶3.)
12. Nakajima taught that to solve the coloration problem, it was known to use tocopherols concomitantly with a number of compounds including polycyclic phenolic compounds and phosphite compounds. (4-5.)
13. Nakajima reported solving the problem with a mixture of a 6-hydroxychroman compound (i.e., a tocopherol), and a phenolic compound or a phosphonite compound. (6, ¶2.)
14. Nakajima taught using from 0.01 to 1 part by weight each of tocopherol and phenolic or phosphonite compound, per 100 parts of polyolefin. (7-8.)
15. Nakajima's polyolefin could be polyethylene. (8, ¶2.)
16. Nakajima reported that the "concomitant use of the aforesaid [tocopherol] compound A with [phenolic] compound B or [phosphonite] compound C was found to have remarkable synergistic effects that could not be expected from the heretofore-known combination with [tocopherol] compounds. (12-13.)
17. Nakajima measured results on melt index and yellowness index for ethylenic polymers by using a repeated extrusion process. (14, ¶2, 3.)

Laermer

18. Laermer described a stabilizing mixture for polyethylene comprising about one part by weight of a tocopherol compound and from about 1.4 to about 5 parts by weight of a phosphorous-containing secondary antioxidant. (Col. 2, ll. 4-9.)
19. Laermer's examples of phosphorous-containing secondary antioxidants included compounds listed in Appellants' claims. (Col. 2, ll. 10-18 and 40-49.)
20. Laermer reported improved melt index and yellowness index measurements after multi-pass extrusion. (Col. 4, ll. 29-57; and Table 1.)

Second Thürmer Declaration

21. Co-inventor Andreas Thürmer filed a "Declaration Under Rule 132," stating that he has been engaged in screening and development in the field of antioxidants and process stabilizers for polyolefins since March, 1992. (Decl. ¶¶ 3, 4.)
22. The Declaration describes multiple-extrusion tests on four samples, in which melt flow index and color were measured after the 1st, 3rd, and 5th extrusion passes. (Decl. "Testing Conditions.")
23. Tested samples 1 and 2 are said to correspond to Kehrli's Examples 3 and 4; samples 3 and 4 are said to be examples of the claimed invention. (Decl. Table 1.)
24. The Melt Flow Index and Yellowness Index results of the comparison testing are shown in Table 2. (Decl.)

25. Declarant stated that "[t]he obtained results show that the instant synergistic composition according to samples 3 and 4 clearly outperform the stabilizer compositions described in the prior art." (Decl. "Discussion of Results.")

26. Declarant stated that "[s]urprisingly, the instant stabilizing composition with less compounds has a better effect in the stabilization of polyethylene." (*Id.*)

Principles of Law Relating to Unexpected Results

"After evidence or argument is submitted by the applicant in response [to a Patent Examiner's evidence for unpatentability], patentability is determined on the totality of the record . . . ." *In re Oetiker*, 977 F.2d 1443, 1445 (Fed. Cir. 1992).

> [E]ven though applicant's modification results in great improvement and utility over the prior art, it may still not be patentable if the modification was within the capabilities of one skilled in the art, unless the claimed ranges "produce a new and unexpected result which is different in kind and not merely degree from the results of the prior art."

In re Huang, 100 F.3d 135, 139 (Fed. Cir. 1996) (citations omitted). "Only if the results of optimizing a variable are unexpectedly good can a patent be obtained for the claimed critical range." *In re Geisler*, 116 F.3d 1465, 1470 (Fed. Cir. 1997) (quotations omitted). Optimizing a known result effective variable is usually within the level of ordinary skill. *In re Boesch*, 617 F.2d 272, 276 (CCPA 1980); *Geisler*, 116 F.3d at 1470.

Analysis

Stabilizer compositions having the recited phenol, antioxidant and tocopherol were known in the prior art to improve polyethylene melt index and yellowness index. The question is whether Appellants' range of weight ratios produces a new and unexpected result which is different in kind and not merely degree from the results of the prior art. In other words, do the claims cover a critical range having unexpectedly good results?

Before Appellants' invention, it was known that tocopherol caused discoloration when it was used to stabilize polyethylene. (FF11.) Nakajima taught a solution to that problem: add phenol or antioxidant to reduce the discoloration. (FF12.) Thus, the prior art recognized the ratio of phenol or antioxidant to tocopherol as a "result effective variable." Optimizing a known result effective variable is usually within the level of ordinary skill. *Boesch*, 617 F.2d at 276; *Geisler*, 116 F.3d at 1470.

Nakajima taught using 0.01 to 1 part by weight of each component. (FF14.) Nakajima's broad range of variability is inclusive of Appellants' claimed range of weight ratios of hindered phenol:tocopherol from 2:1 to 10:1. (FF14.) Laermer taught ratios of secondary antioxidant to tocopherol of 1.4:1 to 5:1, overlapping the low end of Appellants' range. (FF18.) According to Appellants, Kehrli's Examples 3 and 4 had ratios of hindered phenol:tocopherol of 12.5:1 and 25:1. (App. Br. 7.)

Appellants argue their results are "clearly and unexpectedly superior" to Kehrli's examples. (App. Br. 7.) However, their showing of results is directed not to the claimed range but to only one claimed ratio, i.e., the hindered phenol:tocopherol ratio of 10:1. (App. Br. 7-8.) Appellants'

Declaration states that 10:1 "surprisingly" had a better effect than Kehrli's 12.5:1 or 25:1. (FF26.)

The Examiner found the Declaration insufficiently persuasive for several reasons. [6] (Ans. 6.) In reason number (1), the Examiner discounted the Declaration's multiple extrusion test evidence on the grounds that the claims do not require multiple extrusion. (*Id.*) Appellants object that multiple pass extrusion is well known for testing stabilizer efficacy, citing Laermer's Table 1. (App. Br. 8.) Nakajima and Laermer both used multipass extrusion for testing stabilizer effects on melt index and yellowness index, and both took measurements after 3 and 5 passes. (FF17; FF20.) We therefore find that a person of ordinary skill in the art would have considered the Declaration's multiple extrusion data relevant, and we give it weight. Further, the general rule is that available evidence of composition properties may be considered. *See In re Papesch*, 315 F.2d 381, 391 (CCPA 1963) ("From the standpoint of patent law, a compound and all of its properties are inseparable; they are one and the same thing.").

Given Nakajima's disclosure that the ratio of phenol or antioxidant to tocopherol was a result effective variable for purposes of adjusting discoloration, we find that the result Appellants achieved was not "different in kind and not merely degree" from the prior art. *Huang*, 100 F.3d at 139.

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[6] The Examiner's third reason is that a 10:1 ratio of tetrakis-phenol to α-tocopherol would have been an obvious modification. (Ans. 6.) We do not agree with reason (3) because it simply adheres to the original rejection without weighing the rebuttal evidence. All the available evidence, including the Declaration's rebuttal evidence, must be considered and given whatever weight it is due. *Oetiker*, 977 F.2d at 1445 ("the Board must necessarily weigh all of the evidence and argument").

In other words, changes in melt index and yellowness index were the kind of change to be expected by adjusting the ratio of tocopherol to phenol or antioxidant. *See, e.g., In re Harris*, 409 F.3d 1339, 1344 (Fed. Cir. 2005) ("[t]he 32-43% increase in stress-rupture life, however, does not represent a 'difference in kind' that is required to show unexpected results"); *see also*, *In re Eli Lilly & Co.*, 902 F.2d 943, 948 (Fed. Cir. 1990) (where prior art showed the same compound and its use for Appellant's purpose, Appellant failed to show "that a significant aspect of [the] claimed invention is unexpected in light of the prior art"). Because the results appear to be the kind of result expected from the prior art, we are not persuaded that the degree of change Appellants show is surprising.

We also find that the samples compared in the Declaration are not true side by side comparisons because the amounts of individual antioxidants in Sandostab (which Appellants use in place of Kehrli's antioxidant compounds) are unknown. *See* Declaration Table 1. The samples in the comparative testing also included phosphorous-containing secondary antioxidants, i.e., component (b) of the claim. Kehrli's examples each included three, which the Declaration abbreviates as 200 ppm 4,4'PQ, 100 ppm MPQ, and 100 ppm P68. (Decl. Table 1.) Sample 3, an example of the claimed invention, used 450 ppm Sandostab P-EPQ. (*Id.*) Sample 4, another example of the claimed invention, used 400 ppm Sandostab P-EPQ. (*Id.*) The composition of Sandostab P-EPQ is given in the Specification at 12. While it appears to have the three components of Kehrli's mixture, the proportions vary.

CONCLUSIONS OF LAW

Appellants did not establish unexpected results; and

the evidence of obviousness and the objective evidence of nonobviousness taken together weigh in favor of obviousness.

SUMMARY

We affirm the rejection of claims 1-7, 12 and 13 under 35 U.S.C. §103(a) as unpatentable over Kerhli, Keller, Nakajima, Fukui, and Laermer; and

We affirm the rejection claims 1-7, 9, 12, 13, 15 and 17 under 35 U.S.C. §103(a) as unpatentable over Kehrli, Keller, Nakajima, Fukui, Tamura, and Laermer.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a).

AFFIRMED

cdc

JoAnn Villamizar
Ciba Corporation/Patent Department
540 White Plains Road
P.O. Box 2005
Tarrytown NY 10591